

CLAIMS

The invention claimed is:

1. A mass transfer column comprising:
 - an external upright shell defining an open internal region within the shell;
 - a feed nozzle surrounding an opening in the shell and extending outwardly from the shell, said feed nozzle having a notional center vertical plane extending along a longitudinal axis of said feed nozzle, said opening having a preselected diameter and defining an inlet passage;
 - a feed device within said open internal region and positioned in relation to said opening in the shell to deflect a vapor or mixed phase stream entering said open internal region through said feed nozzle, said feed device comprising an inner wall spaced inwardly from said shell and defining an annular passageway in a space between said inner wall and said shell, said annular passageway being in fluid flow communication with said inlet passage;
 - a pair of upright deflecting surfaces extending from said inner wall toward said opening, each of said deflecting surfaces having an outer end closer to the shell and an opposed inner end closer to the inner wall of the feed device, the deflecting surfaces being generally symmetrically oriented on opposite sides of the center vertical plane of the feed nozzle with the

outer ends of the deflecting surfaces being positioned closer to the center vertical plane than the inner ends of the deflecting surfaces; and

at least a first pair of turning vanes positioned on opposite sides of the center vertical plane of the feed nozzle and spaced from said deflecting surfaces in said annular passageway, each said turning vane having a radially outer end and an opposed radially inner end with said outer end being located closer to said center vertical plane than the inner end.

2. The mass transfer column of claim 1, wherein said turning vanes are generally symmetrically oriented on said opposite sides of the center vertical plane.

3. The mass transfer column of claim 2, wherein said turning vanes and deflecting surfaces divide the inlet passage into subpassages of generally equal transverse widths.

4. The mass transfer column of claim 2, wherein said turning vanes and deflecting surfaces divide the inlet passage into subpassages of generally equal vertical cross-sectional area.

5. The mass transfer column of claim 2, wherein each of said turning vanes extends vertically and is curved along a horizontal length of the turning vane.

6. The mass transfer column of claim 5, including a second pair of turning vanes generally symmetrically oriented on opposite sides of the center vertical plane of the feed nozzle, the second pair of turning vanes being spaced from the first set of turning vanes on each side of the center vertical plane.

7. The mass transfer column of claim 6, wherein said first and second pairs of turning vanes and said deflecting surfaces divide the inlet passage into subpassages of generally equal transverse width.

8. The mass transfer column of claim 6, wherein said first and second pairs of turning vanes and said deflecting surfaces divide the inlet passage into subpassages of generally equal vertical cross-sectional area.

9. The mass transfer column of claim 2, wherein said diameter of the opening in the shell is greater than a radial width of the annular passageway.

10. The mass transfer column of claim 2, including a second feed nozzle extending outwardly from the shell in an opposite direction from said first feed nozzle in radial alignment with the vertical center.

11. The mass transfer column of claim 2, wherein said inner ends of the deflecting surfaces are coupled with the inner wall of the feed device

12. A mass transfer column comprising:
an external upright shell defining an open internal region within the shell;
a feed nozzle surrounding an opening in the shell and extending outwardly from the shell in radial alignment with a vertical center axis of said shell, said feed nozzle having a notional radially extending center vertical plane, said opening having a preselected diameter and defining an inlet passage;

a feed device within said open internal region and positioned in relation to said opening in the shell to deflect a vapor or mixed phase stream entering said open internal region through said feed nozzle, said feed device comprising an inner wall spaced inwardly from said shell and defining an annular passageway in a space between said inner wall and said shell, said annular passageway being in fluid flow communication with said inlet passage;

a pair of upright deflecting surfaces extending from said inner wall toward said opening, each of said deflecting surfaces having an outer end closer to the shell and an opposed inner end closer to the inner wall of the feed device, the deflecting surfaces being generally symmetrically oriented on opposite sides of the center vertical plane of the feed nozzle with the outer ends of the deflecting surfaces being positioned closer to the center vertical plane than the inner ends of the deflecting surfaces; and

at least a first pair of turning vanes positioned on opposite sides of the center vertical plane of the feed nozzle and spaced from said deflecting surfaces in said annular passageway, each said turning vane having a radially outer end and an opposed radially inner end with said outer end being located closer to said center vertical plane than the inner end.

13. The mass transfer column of claim 12, wherein said turning vanes are generally symmetrically oriented on said opposite sides of the center vertical plane.

14. The mass transfer column of claim 13, wherein said turning vanes and deflecting surfaces divide the inlet passage into subpassages of generally equal transverse widths.

15. The mass transfer column of claim 13, wherein said turning vanes and deflecting surfaces divide the inlet passage into subpassages of generally equal vertical cross-sectional area.

16. The mass transfer column of claim 13, wherein each of said turning vanes extends vertically and is curved along a horizontal length of the turning vane.

17. The mass transfer column of claim 16, including a second pair of turning vanes generally symmetrically oriented on opposite sides of the center vertical plane of the feed nozzle, the second pair of turning vanes being spaced from the first set of turning vanes on each side of the center vertical plane.

18. The mass transfer column of claim 17, wherein said first and second pairs of turning vanes and said deflecting surfaces divide the inlet passage into subpassages of generally equal transverse width.

19. The mass transfer column of claim 17, wherein said first and second pairs of turning vanes and said deflecting surfaces divide the inlet passage into subpassages of generally equal vertical cross-sectional area.

20. The mass transfer column of claim 13, wherein said diameter of the opening is greater than a radial width of the annular passageway.

21. The mass transfer column of claim 13, including a second feed nozzle extending outwardly from the shell in an opposite direction from said first feed nozzle in radial alignment with the vertical center.

22. The mass transfer column of claim 13, wherein said inner ends of the deflecting surfaces are coupled with the inner wall of the feed device

23. A method of distributing a vapor or mixed phase stream within an open internal region within a mass transfer column as set forth in claim 1, said method comprising:

delivering said vapor or mixed phase stream through said feed nozzle to said annular passageway;

dividing said vapor or mixed phase stream among said subpassages to cause only a portion of said vapor or mixed phase stream to impact against said inner wall of the feed device;

then flowing said vapor or mixed phase stream circumferentially along said annular passageway;

removing at least a portion of said vapor or mixed phase stream through an open bottom of said annular passageway; and

passing vapor from said portion of said vapor or mixed phase stream upwardly through an open center of said feed device.

24. The method of claim 23, including passing said vapor from said portion of said vapor or mixed phase stream upwardly through an overlying zone containing mass transfer devices.